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Cross-layer Architecture and Optimizations in Hybrid Wireless Mesh Networks

Stefan Bouckaert, Ingrid Moerman and Piet Demeester
Supervisor(s): Ingrid Moerman

Mobile wireless ad-hoc communication networks have been the subject of international research for over thirty years. A mobile ad-hoc network or MANET is a self-forming wireless network which does not rely on any fixed infrastructure or central control unit. Even though ever more devices get equipped with wireless interfaces, MANETs are hardly used nowadays. This is because most research efforts have focused on homogeneous network nodes under specific topologies, using layered network protocol design inherited from fixed networks. The goal of this research is to make the use of MANETS on a large scale possible, by combining the view that pure ad hoc networks are evolving toward wireless mesh networks, in which wireless nodes form a cheap and flexible extension of the existing wired network, with the findings of recent studies that a performance gain can be achieved by exchanging parameters between different network layers, leading to cross-layer protocol design.

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Burst-mode Receivers for Long-reach Amplified Optical Networks at 10 Gbit/s

Tine De Ridder, Peter Ossieur, Xing-Zhi Qiu and Jan Vandewege
Supervisor(s): Jan Vandewege

This paper presents a very promising optical fibre network with exceptional performance, being designed for the European IST project PIEMAN (Photonic Integrated Extended Metro and Access Network). The aim of PIEMAN is to build a single optical fibre-to-the-home network that can offer broadband access to more than 16000 customers. Over up to 100 km distance, the PIEMAN network will use 32 wavelengths modulated at 10 gigabit per second. It will offer subscriber data rates up to a 1000 times higher than possible with ADSL or HFC. This doctoral research, performed at INTEC, design, concerns the design of a high-performance 10 Gbit/s optical receiver chip. No chip exists today, that can receive the TDMA data bursts, transmitted by 512 subscribers, at such a high speed. So this design poses a lot of challenges.

7e UGent - FirW Doctoraatssymposium

FACULTEIT INGENIEURSWETENSCHAPPEN

UNIVERSITEIT GENT

14h00 | Het Pand | Onderbergen 1 | 9000 Gent

woensdag 29 november 2006

Information Technology